PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P17324PC00TV	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/NO2004/000124	International filing date *(day/month/year)* 29.04.2004	Priority date *(day/month/year)* 02.05.2003
International Patent Classification (IPC) or national classification and IPC E21B19/10		
Applicant HD OIL TECHNOLOGY AS et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27.10.2004	17.05.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Diaz y Diaz-Caneja, Telephone No. +49 89 2399-7534

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

2-7	as originally filed
1	filed with telefax on 28.04.2005

Claims, Numbers

1-16	filed with telefax on 28.04.2005

Drawings, Sheets

1/3, 2/3	as originally filed
3/3	filed with telefax on 28.04.2005

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/NO2004/000124

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1) Claims 1 to 14 meet the requirements of Art. 33(2)-(4) PCT with respect to the available prior art.

Prior art discloses a pipe handling device having a slip assembly for supporting drill pipes and casings.

The problem to be solved by the present invention may be regarded as how to simplify the work for the personnel while reducing their risk.

The solution to this problem is found in claim 1, where the tension element will easily enable the personnel to pull the lifting device away from the pipe.

Therefore, the skilled person had no incentive to include such feature in the known lifting device in order to solve the problem posed. Consequently, the subject-matter of claim 1 meets the requirements of Art. 33(2)-(4) PCT.

2) Referring to claims 15 to 16:
Claim 15 has been interpreted as referring to "a method for releasably supporting a pipe string by means of a lifting device as in claim 1" and as such is new and inventive.
The present wording "for a lifting device according to claim 1" is unclear as it is not unambiguously apparent wether it limits the scope of claim 15 or not.

System, lifting device and method for supporting a pipe string

The present invention relates to a system for supporting a pipe string comprising at least one pipe element, the supporting device and a method for supporting the pipe string.

On many occasions there is a need to support a pipe string consisting of at least one pipe element while an additional pipe element is being connected to the pipe string. An example of such an occasion is the installation of casings in an oil well, but it may also be in connection with the assembly of drill strings or the installation of risers, water pipes etc.

A casing that has to be installed in a drilling oil well or other types of pipe strings usually consists of a plurality of pipe elements which are connected at the installation site, while being lowered into the cavity where it is to be employed/installed. A pipe element is lifted by a lifting device such as a crane on the deck of the installation structure and inserted into the cavity. The lifting device is usually attached to the end of the pipe string and when an additional pipe element has to be attached to the pipe string, the pipe string has to be supported in a different manner than by the lifting device, while one end of a new pipe element is attached to the pipe string. When the pipe element is attached to the pipe string, the lifting device must be attached once more to the free end of the pipe string, thus enabling the pipe string with the new pipe element to be lowered further into the cavity. During installation a casing, for example, is normally passed through a through-going opening in the installation deck. To support the drill string, a bushing with an internally conical surface is normally placed manually around the drill string in the through-going opening. Slips consisting of a plurality of wedge elements are manually disposed by the personnel in the gap between the pipe string and the bushing. The pipe string is then lowered by the lifting device, thus causing the slips to engage with the bushing and the pipe string, thus securing the pipe string securely by means of the wedge effect. The lifting device is then released from the pipe string. A new pipe element is secured to the pipe string and the lifting device is secured to the free end of the additional pipe element, i.e. the free end of the pipe string. By means of the lifting device the pipe string is then raised slightly so that the slips disengage from the pipe string and the slips are lifted manually away from the pipe string by the personnel. The pipe string is thus released for further lowering into the cavity until the process has to be repeated for connecting yet another pipe element to the pipe string. Previously known systems for performing such an activity is for instance described in US 2736941, US 2636241 and US 2570039.

This is a very hard job physically for the personnel and also entails a certain amount of risk of injury to the personnel involved in setting and removing the slips.

The object of the present invention is to make the work simpler and easier for the personnel while reducing the risk to the personnel. It is also an object to provide a

[redacted]

CLAIMS

1. A lifting device (1) for lifting a wedge device (3) for the purpose of pipe connection of several pipe elements,
where the lifting device (1) comprises an attachment foundation (10), a lifting arm (11) and a replaceable tension element (14), where the lifting arm (11) has an inner arm portion (12) pivotally connected to the attachment foundation (10) and an outer arm portion (13), characterised in that that the tension element (14) is substantially in the form of a circular arc and is releasably, pivotally connected to the outer arm portion (13), thus enabling the wedge device (3) to be releasably attached to the tension element (14) for lifting out of and into an active position, and where the tension element (14) is designed with flexibility so that it compresses into a circle when the wedge device(s) is in an active position, with the result that the tension element (14) experiences pre-tension..

2. A lifting device according to claim 1,
characterised in that the outer arm portion (13) of the lifting arm (11) is substantially U-shaped.

3. A lifting device according to claim 1,
characterised in that the tension element (14) comprises a ring element in the form of a circular arc, where the open section of the circular arc is substantially equal to or slightly smaller than the pipe diameter of the pipe string (2) that has to be supported.

4. A lifting device according to claim 3,
characterised in that the length of the tension element (14) is at least equal to or longer than the outer circumference of the pipe string (2) that has to be supported.

5. A lifting device according to claim 3,
characterised in that stoppers (16) are attached on the tension element's (14) ends of the circular arc.

6. A lifting device according to claim 1,
characterised in that a bracket (17) is attached to the lifting arm (11) near the bottom of the U-shape and that a central point of the tension element's (14) circular arc is pivotally connected to the bracket (17).

7. A lifting device according to claim 1,
characterised in that the outer portions of the U-shaped arm portion (13) are connected to at least two points on the tension element (14) by at least two flexible connecting elements (18).

8. A lifting device according to claim 5, characterised in that there are two connecting elements (18) and that these are mounted at opposite sides of the tension element (14).

9. A lifting device according to claim 5 or 6, characterised in that the attachment points for the connecting elements (18) on the lifting arm (11) are spaced at a greater distance apart than the attachment points for the connecting elements (18) on the tension element (14).

10. A lifting device according to claim 1, characterised in that the wedge device (3) comprises a plurality of wedge elements (31) where the wedge elements (31) are connected individually to the tension element (14).

11. A lifting device according to claim 1, for supporting a pipe string (2) comprising at least one pipe element, to which pipe string (2) an additional pipe element has to be connected, where the pipe string may, for example, be a casing in a well, characterised in that it comprises an abutment element (4), where the wedge device (3) is releasably secured to the tension element (14), thus enabling the wedge device (3) to be moved by means of the lifting device (1) from an inoperative position in a position above the abutment element (4) to an operative position where the wedge device (3) abuts against the abutment element (4), thus securing the pipe string (2) by means of the wedge effect.

12. A lifting device according to claim 11, characterised in that in an active position in abutment against the abutment element (4) the wedge device (3) completely encircles the pipe string (2).

13. A system according to claim 11, characterised in that the attachment foundation (10) comprises attachment devices for releasable attachment of the attachment foundation (10) to the abutment element (4) and/or a base.

14. A system according to claim 11, characterised in that the abutment element (4) is segmented.

15. A method for releasably supporting a pipe string during connection of a new pipe element to the pipe string, characterised in that for a lifting device according to claim 1 a tension element is chosen which is adapted to the diameter of the pipe element of the pipe string that has to be supported, that a wedge device is mounted on the tension element, that an abutment element is placed round the pipe element, that the lifting device with the wedge device are secured relative to the abutment element, that the wedge device is lowered to an active position by the lifting device, thus securing the pipe string.

16. A method according to claim 15, characterised in that the wedge device comprises wedge elements (31) which are inserted onto the tension element.

Fig.3.

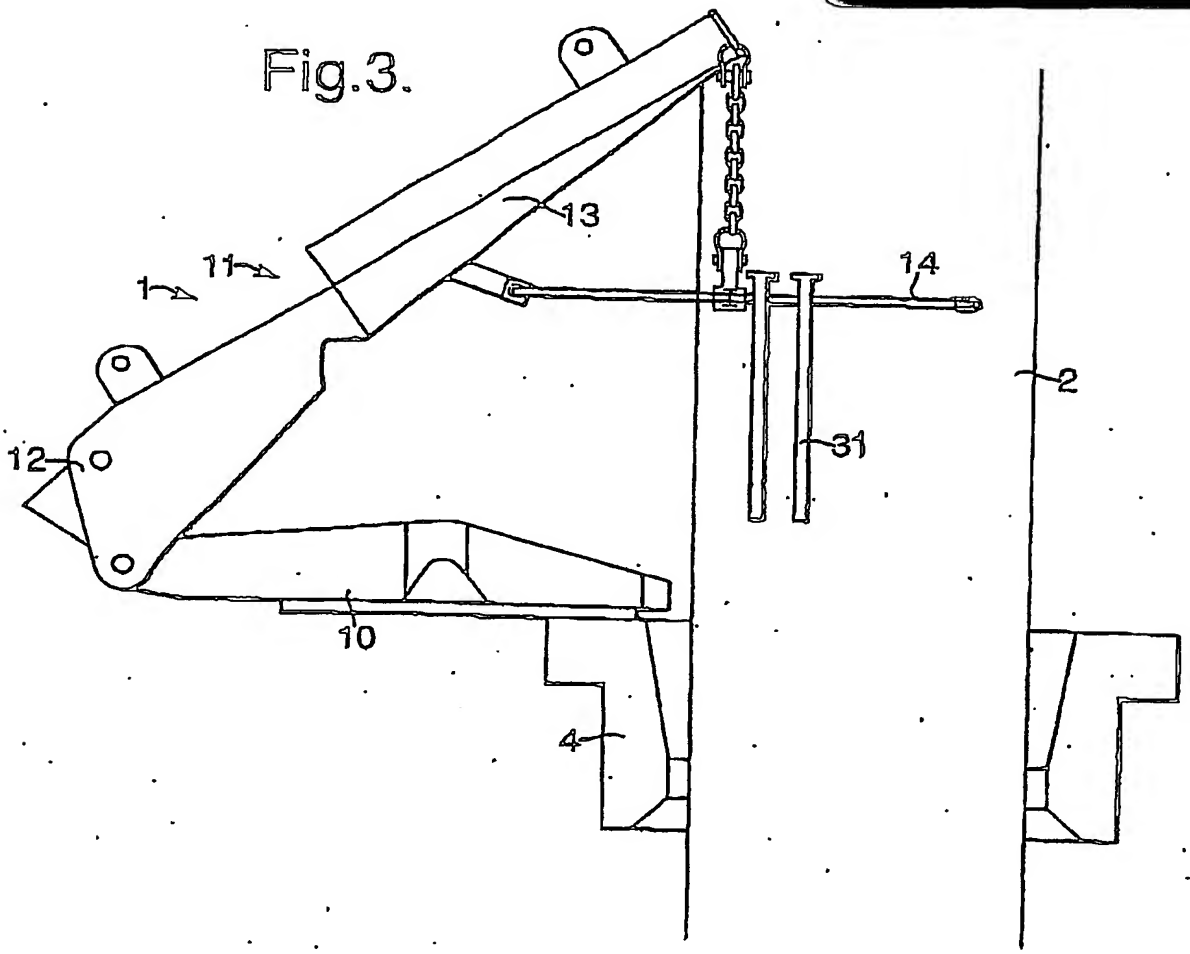

Fig.4.